

15. Tighten the differential mounting bolts to the following torque specifications:

- Tighten the front differential mounting bracket bolts to 22 N•m (16 ft.-lb.).
- Tighten the lower mounting bolt to 44 N•m (33 ft.-lb.).

- Tighten the upper mounting bolt to 44 N•m (33 ft.-lb.).

16. Remove the piece of wire installed in Step 5.

17. Install the inner front fender panel and center mudguard.

FRONT DIFFERENTIAL

The front differential gearcase can be removed with one front drive axle still attached to the steering knuckle. The front driveshaft may be removed before the differential, or removed with the differential. If it is only necessary to remove the driveshaft, refer to *Driveshaft* in this chapter.

Removal

- Remove the front wheels.
- Remove the center mud guard and inner front fender panel on the left side of the vehicle as described in Chapter Fifteen.
- Remove one or both front drive axles as described in this chapter.
- Disconnect the vent hose (A, **Figure 42**) from the differential gearcase.
- Remove the lower front differential mounting bolt (B, **Figure 42**).
- Remove the upper front differential mounting bolt (C, **Figure 42**) and spacer (D).
- Remove the front differential front mounting bracket bolts (**Figure 35**).
- Push the front differential forward, then push the front driveshaft forward so it disconnects from the engine output shaft (**Figure 36**).
- If necessary, remove the front driveshaft as described in this chapter.
- Remove the front differential gearcase (**Figure 42**) from the frame.
- Remove the front mounting bracket.

Backlash Measurement/Adjustment

Perform gear backlash measurement prior to disassembly to determine gear wear and whether the internal shim thicknesses must be adjusted. Measuring gear backlash is also necessary after overhaul.

- Install the pinion puller base, puller shaft, adapter and special nut as shown in **Figure 43** so

any pinion end play is removed and the pinion cannot rotate.

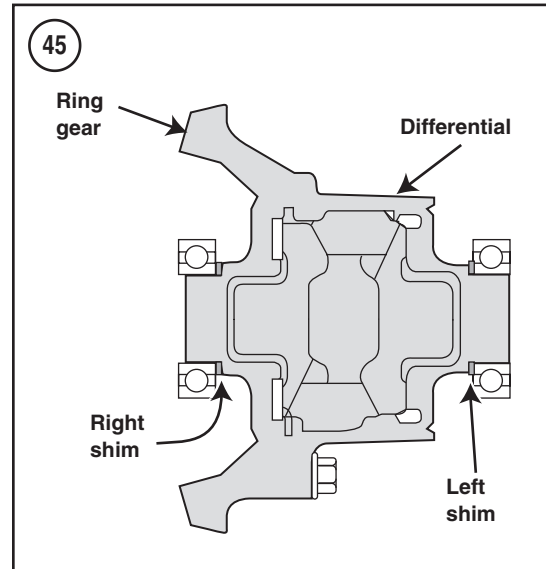
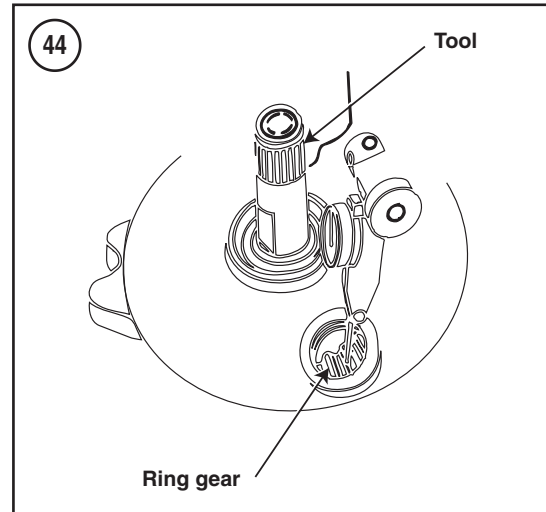
2. Place the differential in a soft-jawed vise.
3. Insert the differential inspection tool (Honda part No. 07KMK-HC5010A) into the right side of the differential so it engages the internal splines.
4. Remove the oil fill cap.
5. Position a dial indicator so the tip rests against a gear tooth (**Figure 44**).
6. To determine the gear backlash, gently rotate the differential inspection tool while reading the dial indicator. Refer to **Table 1** for the specified backlash.
7. Remove the dial indicator, then rotate the ring gear using the inspection tool and take two additional backlash readings 120° from the original measuring point. If the difference between any two readings exceeds 0.2 mm (0.01 in.), note the following:
 - a. The differential assembly is not square in the case, which may be due to the incorrect seating of a bearing.
 - b. The housing may be deformed.
8. To correct the gear backlash, refer to **Figure 45** and note the following:
 - a. If gear backlash is less than the desired specification, reduce the thickness of the right shim and increase the thickness of the left shim.
 - b. If gear backlash is greater than the desired specification, reduce the thickness of the left shim and increase the thickness of the right shim.

NOTE

When adjusting shim thickness, adjust the sides equally. For instance, if the right shim is increased 0.10 mm (0.004 in.), decrease the left shim 0.10 mm (0.004 in.). Changing a shim thickness by 0.10 mm (0.004 in.) will change backlash 0.06 mm (0.002 in.).

Disassembly

The front differential gearcase requires a number of special tools for disassembly, inspection and reassembly. The price of these tools could be more than the cost of most repairs performed at a dealership. Read the procedure and determine the cost before undertaking the repair.



The face cams, differential housing and cover are available only as a unit assembly.

If the pinion gear, ring gear, gearcase, case cover, side bearings or pinion shaft bearing are replaced, perform the backlash and gear mesh pattern adjustments described in the following sections.

Refer to **Figure 46**.

1. Remove the front mounting bracket from the gearcase.
2. Remove the cover retaining bolts in a crossing pattern (**Figure 47**).
3. Insert a prying tool in the gap between the gearcase and cover (**Figure 48**), and pry the cover off the gearcase.

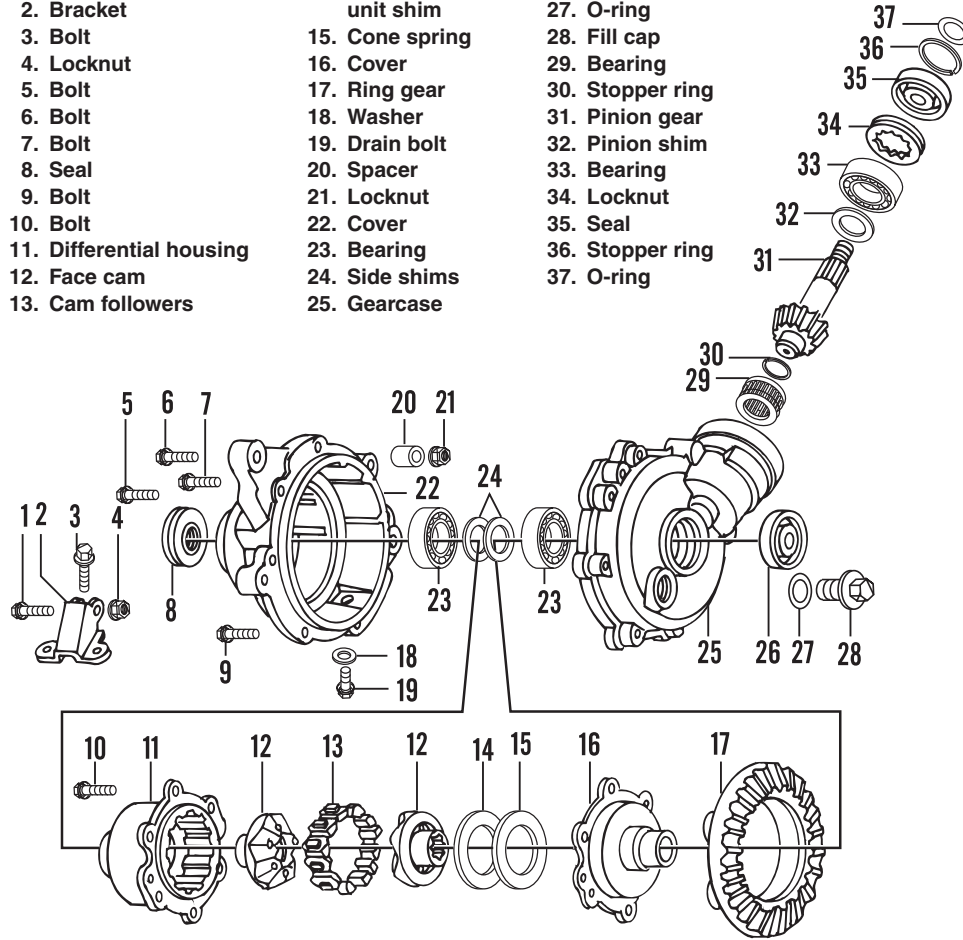
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FRONT DIFFERENTIAL

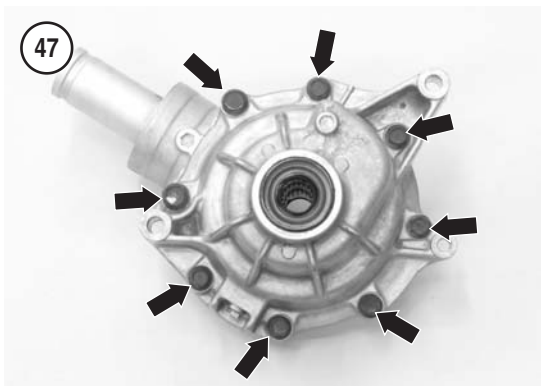
1. Bolt
2. Bracket
3. Bolt
4. Locknut
5. Bolt
6. Bolt
7. Bolt
8. Seal
9. Bolt
10. Bolt
11. Differential housing
12. Face cam
13. Cam followers

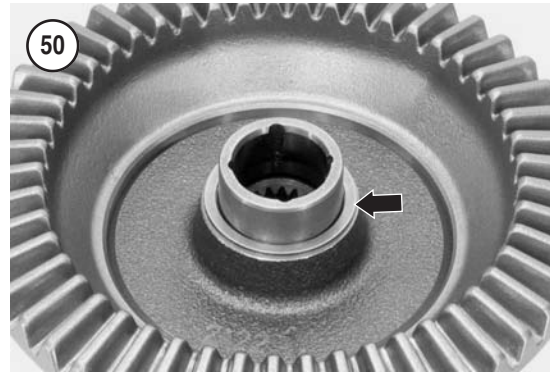
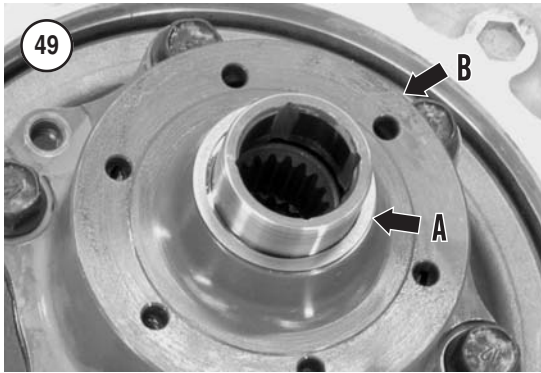
14. Differential unit shim
15. Cone spring
16. Cover
17. Ring gear
18. Washer
19. Drain bolt
20. Spacer
21. Locknut
22. Cover
23. Bearing
24. Side shims
25. Gearcase

26. Seal
27. O-ring
28. Fill cap
29. Bearing
30. Stopper ring
31. Pinion gear
32. Pinion shim
33. Bearing
34. Locknut
35. Seal
36. Stopper ring
37. O-ring



11

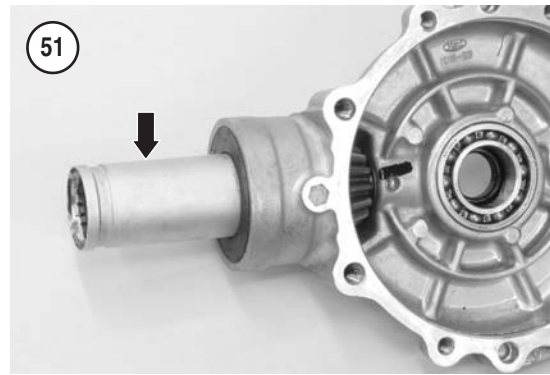




4. Note the right-side shim on the differential housing (A, **Figure 49**). Remove the shim, label it and set it aside.
5. Remove the differential assembly (B, **Figure 49**).
6. Note the left-side shim on the differential housing (**Figure 50**). Remove the shim, label it and set it aside.

NOTE

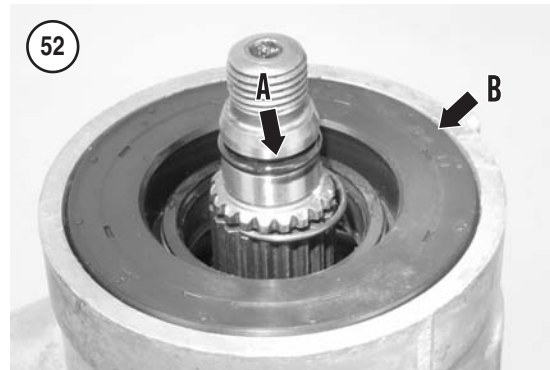
The pinion joint is retained by a wire ring on the pinion shaft that fits in a groove in the pinion joint.



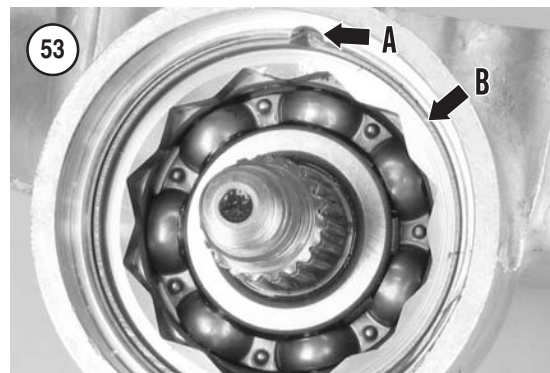
7. Pull out the pinion joint (**Figure 51**).
8. Remove the O-ring (A, **Figure 52**).
9. Using a suitable seal puller, remove the oil seal (B, **Figure 52**).
10. Rotate the pinion shaft and check for noisy or rough pinion bearings.

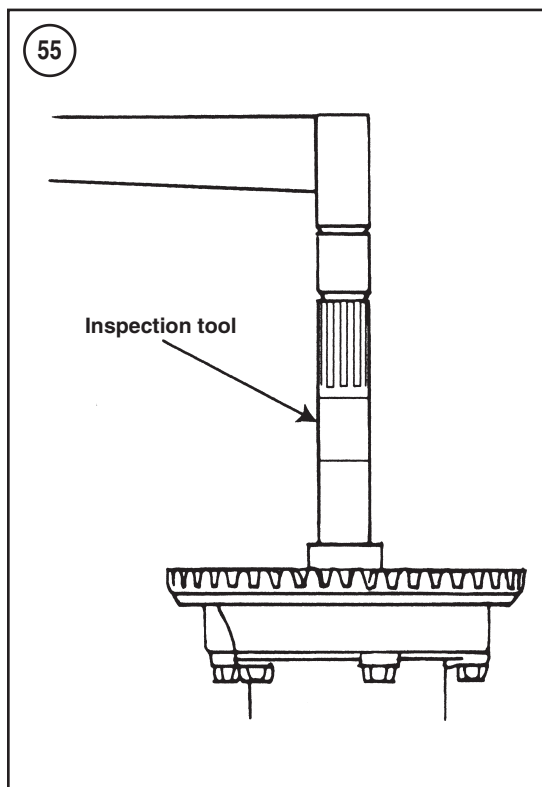
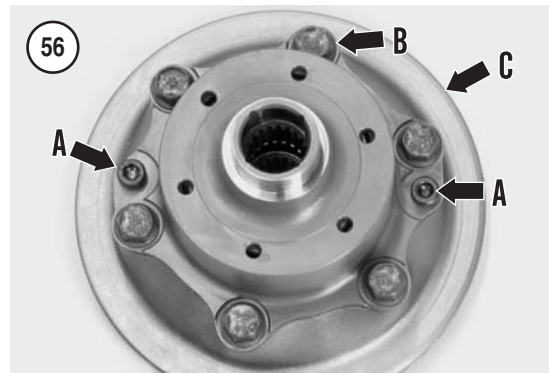
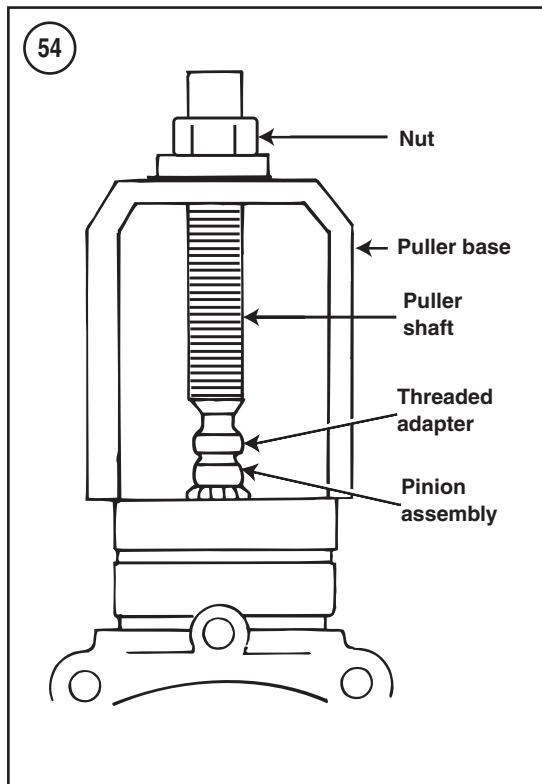
NOTE

Cover the internal parts when unstaking the locknut in Step 11 to prevent the entry of metal debris.



11. Using a grinder or metal removal tool, remove the staked portion of the locknut (A, **Figure 53**).
12. Using the locknut wrench (Honda part No. 07916-ME50001) or an equivalent, remove the locknut (B, **Figure 53**).
13. Assemble the following tools as shown in **Figure 54**, and remove the pinion and bearing assembly.
 - a. Pinion puller base (Honda part No. 07HMC-MM8011A).
 - b. Puller shaft (Honda part No. 07931-ME4010B).
 - c. Adapter (Honda part No. 07YMF-HN4010A).
 - d. Special nut (Honda part No. 07931-HB3020A).





14. Before disassembling the differential unit, check the slip torque to determine its operating condition as follows:

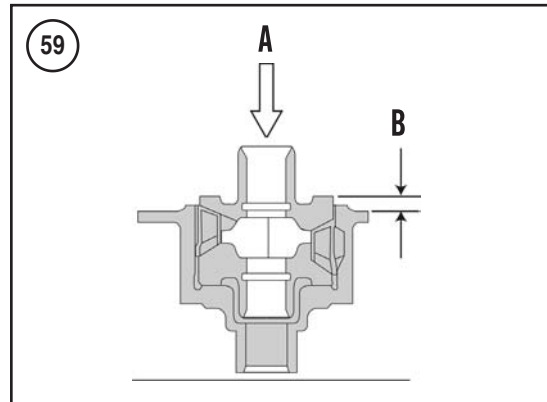
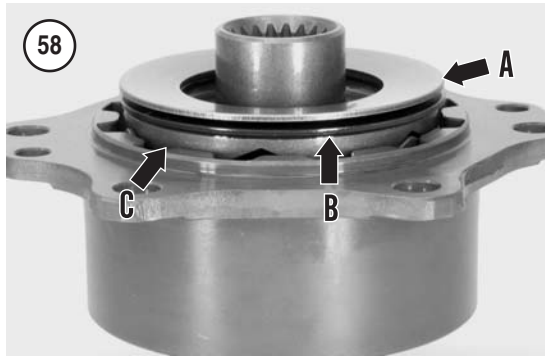
- a. Install the differential inspection tool (Honda part No. 07KMK-HC5010A) into both face cams.
- b. Secure the flat surface of the tool in a vise.
- c. Rotate the tool with a torque wrench (**Figure 55**). Refer to **Table 1** for the specified torque reading.
- d. Disassemble, inspect and, if necessary, repair the differential unit if the torque reading is below specification.

15. Install two short 6 mm socket-head bolts into the differential housing (A, **Figure 56**) to hold the cap to the housing while removing the ring gear bolts.

16. Remove the ring gear mounting bolts (B, **Figure 56**) and remove the ring gear (C).

17. Remove the two temporary bolts and remove the differential cap (**Figure 57**).

18. Remove the cone spring (A, **Figure 58**) and shim (B).



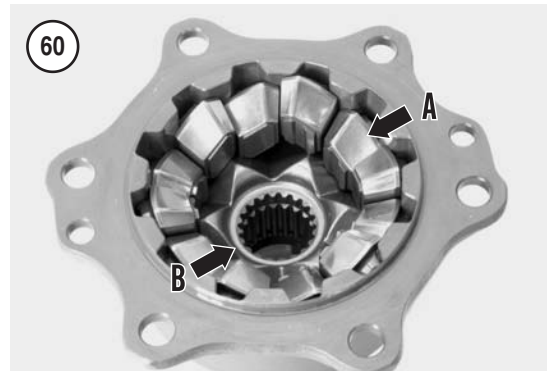
19. Check the differential unit for excessive wear as follows:

- Using a press or other means, apply 1.47 kN (330 lb.) to the face cam hub (A, **Figure 59**).
- Measure the distance from the face cam to the differential housing mating surface (B, **Figure 59**).
- If the distance exceeds the specification in **Table 1**, the differential unit is excessively worn and should be replaced.

20. Remove the left face cam (C, **Figure 58**).

21. Remove the cam followers (A, **Figure 60**).

22. Remove the right face cam (B, **Figure 60**).



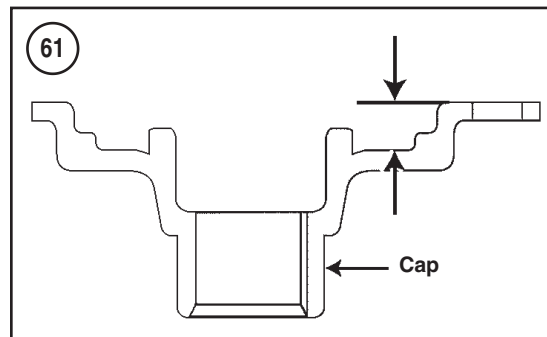
Inspection

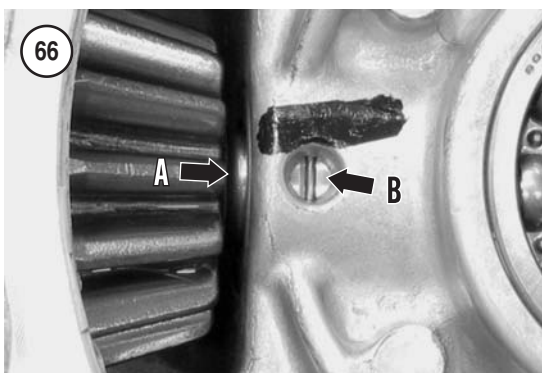
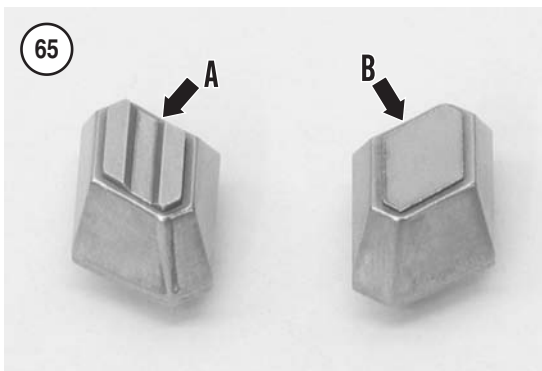
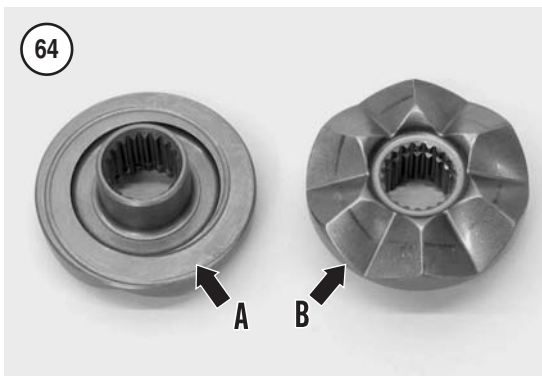
- Clean, then inspect, all components for excessive wear and damage. Carefully remove gasket material from the mating surfaces on the differential cover and gearcase.
- Measure the depth of the spring seating surface in the differential cap (**Figure 61**). Replace the cap if the depth exceeds the specification in **Table 1**.
- Inspect the grooves and sliding surfaces in the differential housing (**Figure 62**).
- Measure the height of the cone spring. Replace the spring if the height is less than the specification in **Table 1**.

NOTE

If bearing replacement is required, install new oil seals after bearing installation.

- Remove the oil seals in the differential gearcase and cover using a suitable seal removal tool. Install a new oil seal so the flanged side is out (**Figure 63**).
- Turn the bearings in the differential gearcase and cover by hand. The bearings should turn freely and





without any sign of roughness, catching or excessive noise. Replace the damaged bearings as described in *Basic Service Methods* in Chapter One. The bearing must bottom in the gearcase or cover bore.

7. Examine the face cam sliding surface (A, **Figure 64**) and cam surfaces (B).

8. Examine the sliding surfaces of the cam followers (**Figure 65**). The cam followers must be replaced as a set.

9. Inspect the pinion needle bearing (A, **Figure 66**) in the gearcase. If it is damaged, replace the bearing using the following procedure:

- a. Using needlenose pliers, extract the wire retainer ring (B, **Figure 66**) through the access hole. Rotate the ring so the end is accessible, pry out the end and pull out the ring.

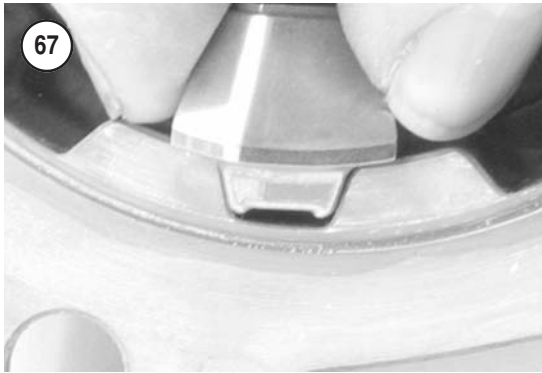
CAUTION

Do not use a flame to heat the gearcase; it can warp the gearcase.

- b. Heat the gearcase in an oven to 176° F (80° C) and extract the bearing.
- c. Install a new wire ring into the groove on the outside of the new bearing.
- d. Install the bearing into the ring compressor tool (Honda part No. 07YME-HN4010A).
- e. Place the compressor tool with the bearing into a freezer for at least 30 minutes.
- f. Heat the gearcase in an oven to 176° F (80° C).
- g. Position the compressor in the gearcase and drive the bearing into the gearcase. Only one blow should be required. Multiple blows may dislodge the wire ring, which will require the installation of a new ring and bearing. Make sure the wire ring is properly positioned as viewed in the access hole (B, **Figure 66**).

10. Inspect the pinion gear and bearing. If the bearing must be replaced, replace it as follows:

- a. Using a press or puller, remove the bearing from the pinion shaft.
- b. If only the bearing is being replaced, use the original shim on the pinion shaft. If the differential cover or housing, ring and pinion gears or the side bearings are being replaced, install a 2.0 mm (0.79 in.) thick shim as a starting point for the gear position adjustments.
- c. Press or drive the new bearing onto the pinion shaft so the marked side of the bearing is toward the threaded end of the shaft.



Assembly

Refer to **Figure 46** when performing the following procedure. Install the bearings and oil seals as described in *Inspection*.

NOTE

Lubricate all moving parts with SAE 80 hypoid gear oil.

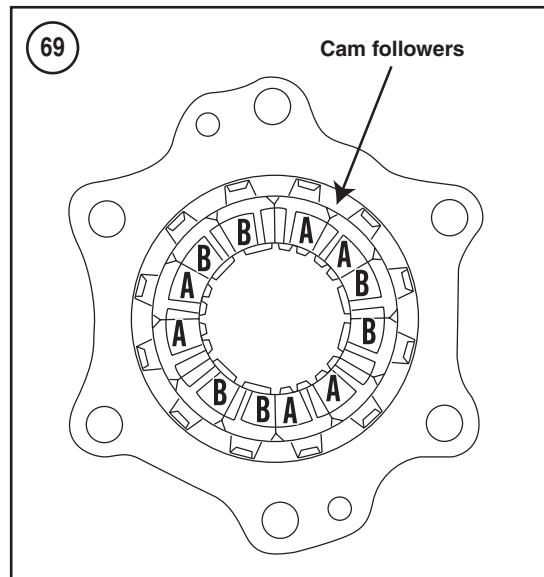
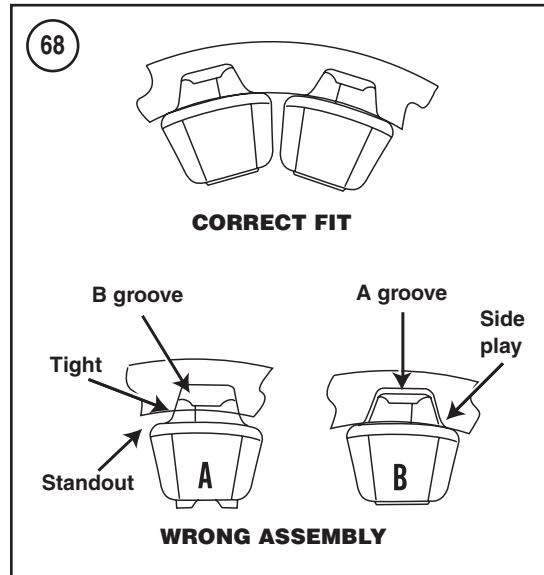
1. Install the face cam into the differential housing.
2. Note that there are two types of cam followers. Type A followers are ribbed while type B followers are flat. Refer to **Figure 65**. Each type of cam follower must fit into a corresponding groove in the differential housing (**Figure 67**). The cam follower must engage the groove fully, to its maximum depth without excessive side play. A type A follower in a B groove will result in a tight fit and it will standout. A type B follower in an A groove will have excessive side play. Refer to **Figure 68**.

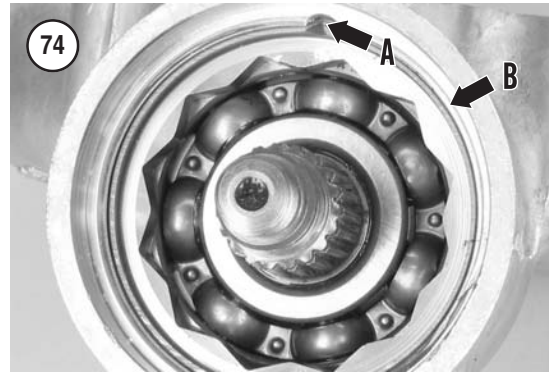
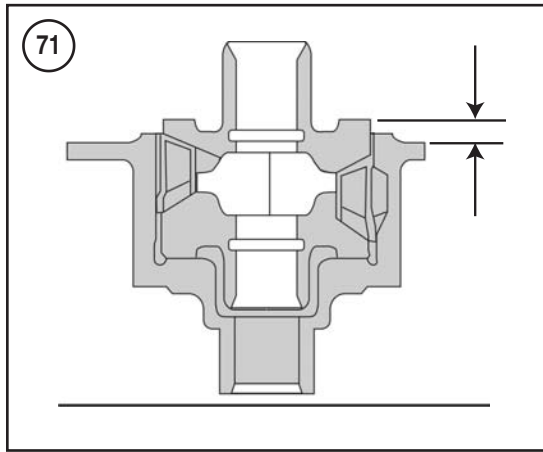
3. Install the cam followers in pairs as shown in **Figure 69**.

4. Install the face cam onto the cam followers (**Figure 70**).

5. Determine the thickness of the differential unit shim (14, **Figure 46**) as follows:

- a. Measure the distance from the face cam to the differential housing mating surface (**Figure 71**).
- b. Measure the depth of the spring seating surface in the differential cap (**Figure 61**).
- c. Subtract the face cam height (**Figure 71**) from the cap depth (**Figure 61**). From the result, subtract 1.7 mm. That result is the desired shim thickness. Select a shim closest in thickness to the calculated desired thickness.





10. Install the pinion gear and bearing into the gearcase.

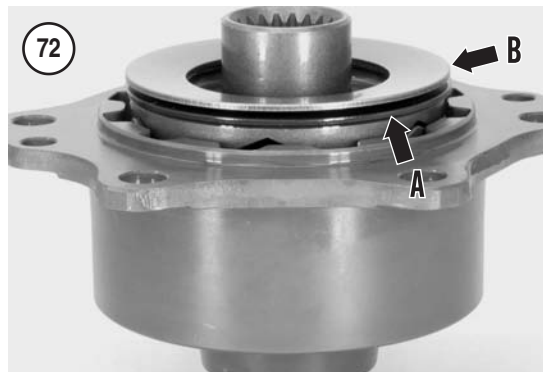
NOTE

The torque wrench attachment point on the Honda tool specified in Step 11 increases wrench leverage. The actual tightening torque is 98 N•m (72 ft.-lb.).

11. Install the locknut (B, **Figure 74**). Using the locknut wrench (Honda part No. 07916-ME50001) tighten the locknut to 89 N•m (66 ft.-lb.) as indicated on the torque wrench.

NOTE

Do not stake the locknut when performing the gear mesh pattern check in Step 12.



6. Install the shim (A, **Figure 72**) and cone spring (B). The cone side of the spring must be out.

7. Install the cap. Secure the cap by installing short 6 mm socket-head screws (A, **Figure 73**).

8. Install the differential unit onto the ring gear (B, **Figure 73**). Tighten new bolts to 49 N•m (36 ft.-lb.).

9. Remove the temporary socket-head bolts (A, **Figure 73**).

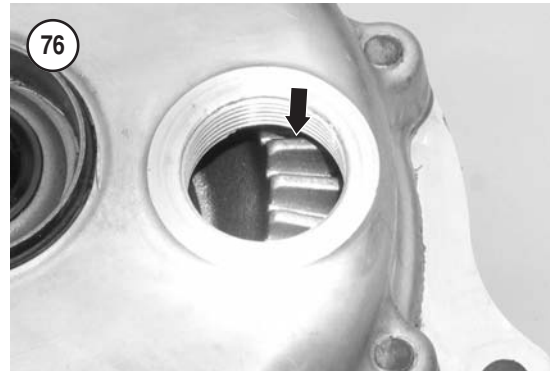
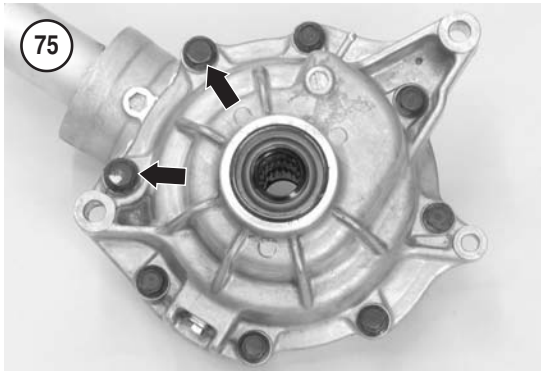
12. If the pinion, ring gear, bearings, gearcase or cover have been replaced, check the gear mesh pattern as follows:

- Apply Prussian Blue or other gear marking compound onto the ring gear teeth.
- Install the side shims (24, **Figure 46**) onto the differential unit, then install the ring gear/differential unit assembly into the gearcase.
- Install the cover onto the gearcase.

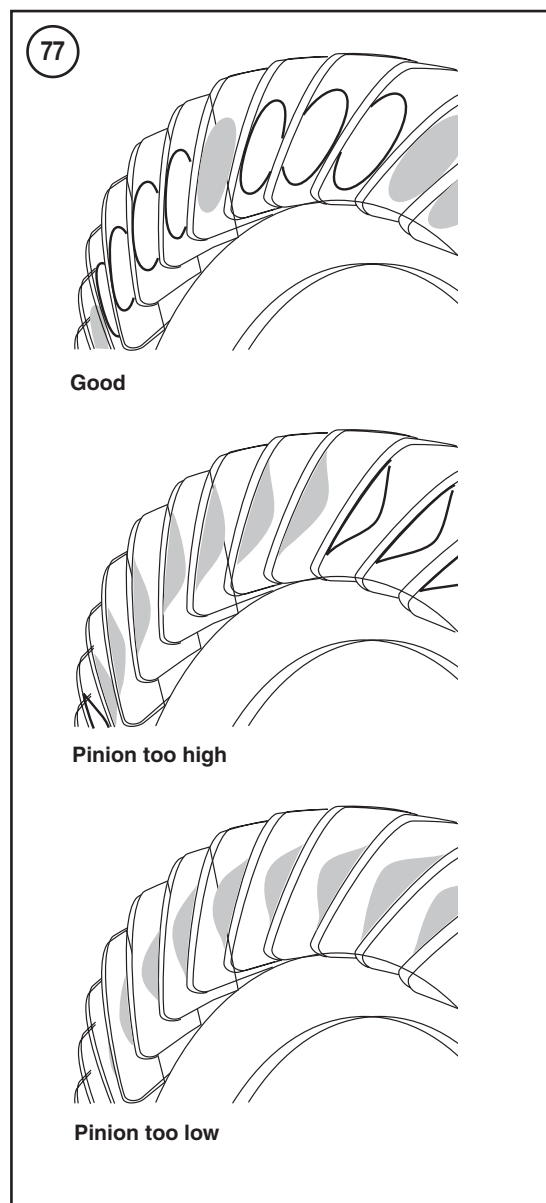
NOTE

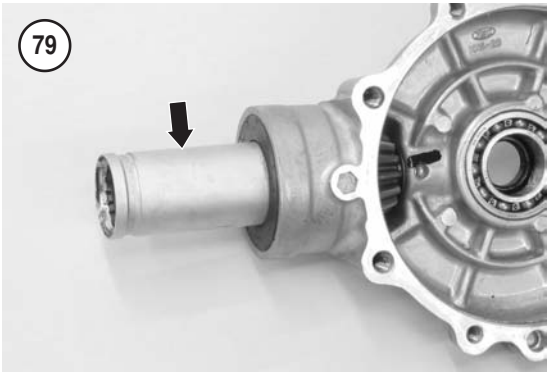
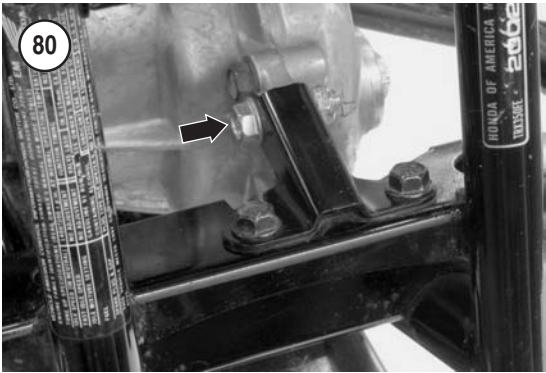
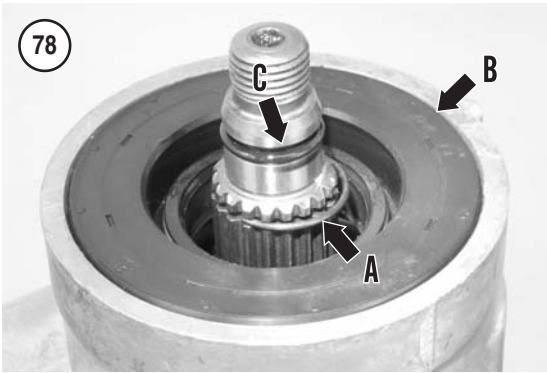
While tightening the cover bolts in substep d, rotate the pinion shaft.

- Install the cover bolts. Install the two 10 mm bolts in the locations shown in **Figure 75**. Tighten the bolts evenly in a crossing pattern in several steps until the cover is seated on the gearcase. Tighten the 8 mm bolts to 25 N•m (19 ft.-lb.). Tighten the 10 mm bolts to 49 N•m (36 ft.-lb.).



- e. Remove the oil fill cap.
 - f. Rotate the pinion shaft several rotations so a pattern is evident on the ring gear teeth. View the ring gear teeth through the gearcase oil fill hole (**Figure 76**).
 - g. Refer to the typical gear patterns in **Figure 77**. If the pinion is low, install a thinner pinion shim (32, **Figure 46**). If the pinion is high, install a thicker shim. Remove the pinion and bearing to replace the shim. Changing shim thickness 0.12 mm (0.005 in.) moves the contact pattern approximately 0.5-1.0 mm (0.02-0.04 in.).
 - h. Reinstall the pinion gear and bearing, if they were removed, as described in Steps 10 and 11.
 - i. After obtaining a satisfactory gear contact pattern, check the gear backlash.
 - j. Remove the cover and differential unit and continue with the final assembly procedure.
13. Stake the pinion locknut (B, **Figure 74**) into the notch in the gearcase (A).
 14. Install the stopper ring (A, **Figure 78**) onto the pinion shaft.
 15. Install the oil seal (B, **Figure 78**) so it is bottomed. Lubricate the oil seal lips with grease.
 16. Apply grease to a new O-ring and install it onto the pinion shaft (C, **Figure 78**).
 17. Lubricate the pinion shaft splines with molybdenum disulfide grease, then install the pinion joint (**Figure 79**). The joint groove must engage the stopper ring on the shaft. Pull lightly on the joint to ensure it is properly installed.
 18. Install the side shims (24, **Figure 46**) onto the differential unit.
 19. Install the ring gear/differential unit assembly into the gearcase.





20. Apply a liquid sealant such as Yamabond No. 4 to the mating surface of the differential cover, then install the cover onto the gearcase.

NOTE
While tightening the cover bolts in Step 21, rotate the pinion shaft.

21. Install the cover bolts. Install the two 10 mm bolts in the locations shown in **Figure 75**. Tighten the bolts evenly in a crossing pattern in several steps until the cover is seated on the gearcase. Tighten the 8 mm bolts to 25 N•m (19 ft.-lb.). Tighten the 10 mm bolts to 49 N•m (36 ft.-lb.).

22. Make sure the gears rotate freely without binding.

Installation

1. Install the front mounting bracket on the gearcase, if it was removed, but do not tighten the bolt.
2. If a front axle remains installed, lubricate the axle splines with grease and insert the axle while installing the front differential.
3. Install the front differential and position it as far forward as possible.
4. Install the driveshaft as described in this chapter.
5. After tightening the upper and lower differential mounting bolts, and the two front bracket bolts, tighten the front gearcase mounting bolt (**Figure 80**) to 22 N•m (16 ft.-lb.).
6. Install the front axle(s) as described in this chapter.
7. Connect the vent hose (A, **Figure 42**) to the differential gearcase and secure it with the clamp.
8. Fill the front differential with the correct amount and type of oil (Chapter Three).

Table 1 FRONT DRIVE SPECIFICATIONS

	New	Service limit
Cone spring free height	2.8 mm (0.11 in.)	2.6 mm (0.10 mm)
Differential housing cap depth	9.55-9.65 mm (0.376-0.380 in.)	9.55 mm (0.376 in.)
Differential slip torque	14-17 N•m (10-12.5 ft.-lb.)	12 N•m (9 ft.-lb.)
Driveshaft length between axle joints	344.8-354.8 mm (13.57-13.97 in.)	—

(continued)

Table 1 FRONT DRIVE SPECIFICATIONS (continued)

	New	Service limit
Face cam-to-housing distance		
2000-2003	6.3-6.7 mm (0.25-0.26 in.)	6.3 mm (0.25 in.)
2004-on	3.3-3.7 mm (0.13-0.15 in.)	3.3 mm (0.13 in.)
Gear backlash	0.05-0.25 mm (0.002-0.010 in.)	0.4 mm (0.016 in.)

Table 2 FRONT DRIVE TORQUE SPECIFICATIONS

	N•m	in.-lb.	ft.-lb.
Differential bolts			
8 mm	25	—	19
10 mm	49	—	36
Differential mounting bolts			
Front mounting bolt	22	—	16
Lower mounting bolt	44	—	33
Upper mounting bolt	44	—	33
Mounting bracket bolts	22	—	16
Pinion locknut*	89	—	66
Ring gear bolts	49	—	36
*Torque wrench reading using Honda tool.			

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